US Rates Watch

Monthly rates models: July ’25 edition

Rates models update

10y nominal & RYs trade slightly cheap to fundamental FVs (<1σ). Stabilizing macro data & fading recession likelihood justify some of that cheapness. BEs continue to trade only marginally wide vs fundamentals as the market fades structural stagflation scenarios on lower tariffs pressure. Funding pressure has softened in recent weeks as TGA liquidity has come into the system & reserve balances have risen. The recent debt limit resolution will now shift to tighter funding conditions due to liquidity drain and large wave of bill supply for TGA rebuild. We expect notable SOFR/FF basis tightening in the next several months. Metrics of portfolio risk bias suggest a slight increase in risk appetite from early June and over the quarter more broadly & short vol bias (carry positive).

Duration and curve

We see 10yT FV c.4.15-4.2% vs macro fundamentals (steady vs. early Jun – Exhibit 1) and c.4.4-4.45% vs the global yield dynamic (also steady vs early Jun – Exhibit 24). Momentum in macro data has been relatively flat over the past month (Broad macro +0.06σ, Inflation +0.10σ, Growth -0.03σ & Employment +0.01σ – Exhibit 4) and has contributed to relatively steady 10yT levels vs fundamentals (and fading volatility). The 2s10s curve continues to look too steep (Exhibit 11).

Breakevens, TIPS and real yields

10y BEs trade only slightly wide vs. FV (c.5bp – Exhibit 15) as stagflation fears faded, RYs marginally cheap (c.5bp – Exhibit 16). The likelihood of expansion scenarios reflected in 10y BEs normalized to 50-55%, from materially higher expansion likelihoods c.80-85% in early Jun (Exhibit 17).

Front end

Debt limit dynamics have led to downward pressure on funding rates as liquidity from the TGA came into the system. The recent debt limit resolution should now drive SOFR/FF basis tighter in 2H25, with SOFR rising faster than FF, driven by increasing marketable debt, rising dealer holdings of USTs and declining liquidity post debt limit resolution. FF stickiness has been surprising but should see upward pressure in 2H25.

Allocations

Metrics of portfolio risk bias suggest a slight upgrade of risk outlook from early Jun (particularly in ETF flows – Exhibit 19) and over 2Q more broadly (Exhibit 20), and a return to carry (short vol bias). ERP widened c.10bp in the past month.

Directional indicators

Expansion likelihoods priced in the dynamic of 10y BEs normalized to c.50-55%, but we continue to see relatively high expansion likelihoods expressed in the dynamic of EM credit vs 10yT yields (c.85-90%, like supporting an EM carry bias) and in the relative dynamic of IG Cash and IG/HY CDX vs. 10yT yields (c.80-100% – Exhibit 29).

07 July 2025

Rates Research
United States

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Glossary

10yT – 10-year Treasury
BE – Breakeven inflation
c. – circa = approximately
Corp – Corporate
DM – Developed Markets
EFFR – Effective Federal Funds Rate
EM – Emerging Markets
ERP – Equity Risk Premium
ETF – Exchange Traded Funds
FF – Fed funds
FV – Fair Value
GDP – Gross Domestic Product
IORB – Interest Rate on Reserve Balances
LC – Large Cap
ON RRP – Overnight Reverse Repo facility
PCA – Principal Component Analysis
QT – Quantitative Tightening
RP – Risk Premium
RV – Relative Value
RY – Real Yield
SC – Small Cap
SOFR – Secured Overnight Financing Rate
TGA - Treasury General Account
VAR – Vector Auto-Regressive
vs. – versus

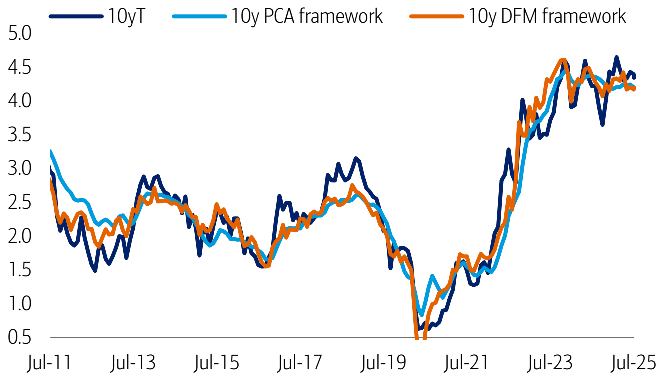
Timestamp: 07 July 2025 10:38AM EDT

List of models

Duration

Macro model

Exhibit 1: 10yT macro fair value
10yT fair value consistent with current fundamentals c.4.15-4.2%



Source: BofA Global Research; Bloomberg

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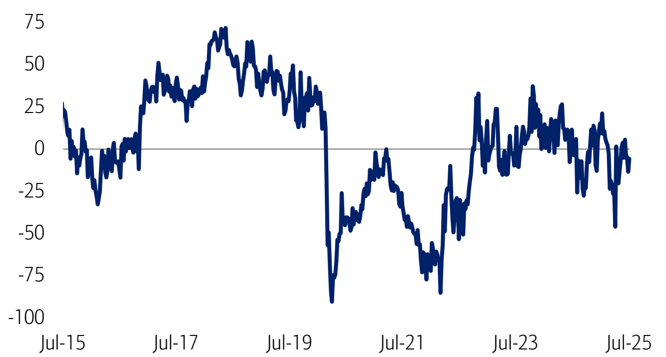
Our macro framework suggests that 10yT fair value consistent with current US fundamentals is c.4.15-4.2%, steady from early Jun '25 (see [Monthly rates models](), 16 Jun '25).

10yT yields trade around c.15bp cheap (<1σ) to the FV range that is consistent with current US macro fundamentals, reflecting expectations for a slight improvement of macro fundamentals in the 1-2 quarters ahead.

Global yield framework

Exhibit 2: Residual of 10yT Global yield model
10yT fair value consistent with global yields c.4.4-4.45%



Source: BofA Global Research

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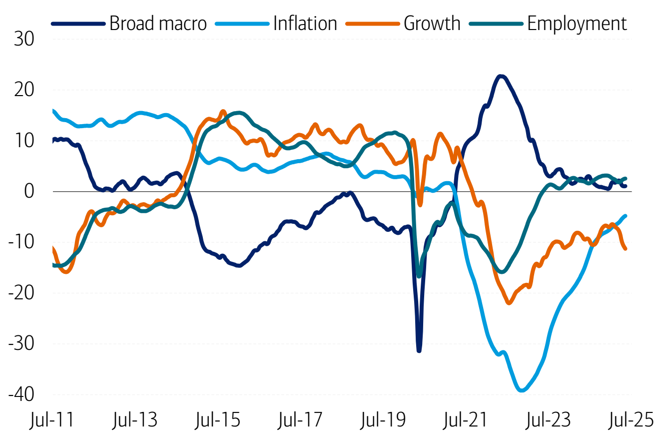
10yT fair value consistent with the global yield dynamic is c.4.4-4.45%, steady since early Jun '25.

10yT yields trade fair / marginally rich relative to the global yield dynamic.

It's important to note that in the late cycle the bias should be for USTs to trade fair to rich to global yields. In this framework, a material 10yT selloff would likely need to be supported by either (1) a broader bearish momentum in global yields or (2) a decoupling of US growth with the DM complex (i.e., American exceptionalism).

Decomposition of US macro fundamentals dynamic

Exhibit 3: Decomposition of US macro fundamentals into 4 factors
Factors show flat momentum in macro data



Source: BofA Global Research

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Our DFM framework for US macro fundamentals reflects the following changes in macro factors over the past month:

- +0.06σ upgrade of Broad macro factor
- +0.10σ upgrade of inflation
- -0.03σ downgrade of growth
- +0.01σ upgrade of employment

Broadly: flat momentum across macro factors.

Evolution of macro factors over the last 3m

Exhibit 4: Evolution of macro factors over the last 3m
Macro data steady over past 4 weeks

	Factor changes					
	4w	**Z-Score**	**8w**	**Z-Score**	**12w**	**Z-Score**
Broad Macro	0.12	0.06	0.13	0.04	0.04	0.01
Growth	-0.04	-0.03	-0.93	-0.43	-2.16	-0.73
Inflation	0.10	0.10	0.41	0.20	0.95	0.31
Employment	0.01	0.01	0.04	0.01	0.33	0.08
10y FV	c.0 bp		c.0 bp		c.-10 bp	
10y yields	c.-15 bp		c.-5 bp		c.-15 bp	

Source: BofA Global Research

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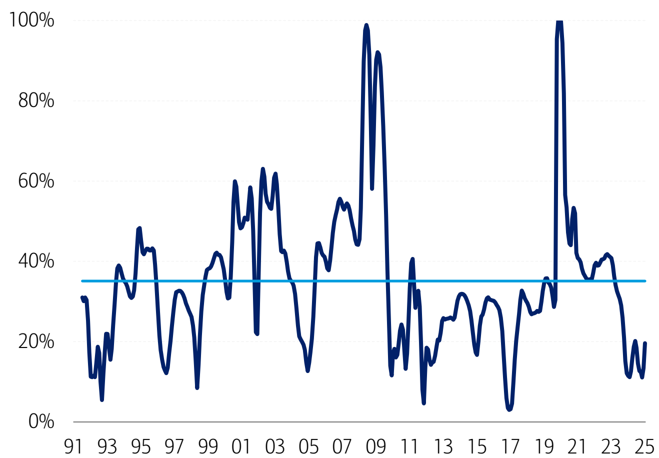
Macroeconomic data has been steady over the last 4w. Negative momentum peaked in late-Mar / early-Apr and has faded fully over the past 3m.

Degree of conviction market may extract from US data

Exhibit 5: Degree of conviction market participants may extract from US macroeconomic data
Degree of conviction market may extract from macro data increased over Jun but continues to be relatively low (high macro data dispersion)



Source: BofA Global Research

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Degree of conviction market may extract from macro data increased over June but continues to be relatively low (broadly reflecting high macro data dispersion).

More uncertainty and more noisy data are likely to support a higher degree of macro data dispersion near term and a further decrease in the degree of conviction the market may extract from macro data.

Range of outcomes for rates & market implied likelihoods

Exhibit 6: Discretization of the range of outcomes for US rates and the economy into 4 potential scenarios
... along with corresponding estimates for the market implied likelihood for each scenario

	Growth	**Inflation**	**Fed policy**	**10yT**	**3y1y OIS**	**Curve dynamic**	**Volatility**	**Likelihoods**
Hard landing	<0%	2% or below	Cuts > 1 per quarter	c.3-3.25%	c.1.5-2%	Bull steepening with 2s10s up to 75-100bp	Higher gamma, lower intermediates	c.10%
Soft landing	>0% & < 2%	2% target	Once / quarter steady pace	c.3.75-4%	c.3-3.5%	Marginally steep curve	Lowest	c.40-45%
Recalibration	At or slightly > c.2% potential	2% medium tern	Fed on-hold at c.4%	c.4.25-4.75%	Max c.4%	Potential bear steepening	Slightly higher steady state	c.30-35%
Reacceleration	> growth and/or > inflation	>2% for longer	On-hold or tighter	Max c.5.5%	1y1y higher, 3y1y c.4-4.25%	Bear flattening in macro or bear steepening in supply dynamic	Highest vol scenario	c.20%

Source: BofA Global Research

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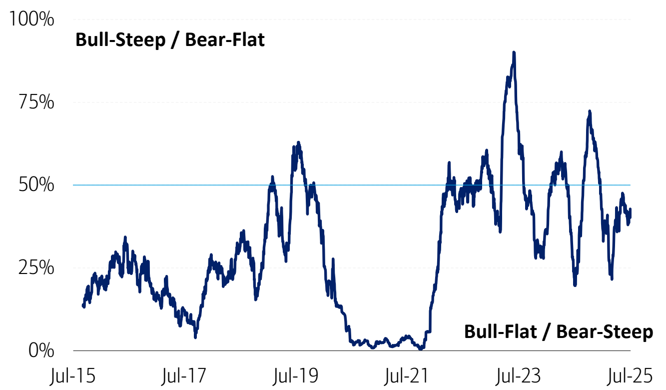
Curve

Curve directionality

Exhibit 7: 2s10s directionality indictor (3m)
2s10s dynamic split between bull & bear flattening in recent weeks



Source: BofA Global Research

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Front end drove c.70% of the 2s10s curve dynamic over the past two weeks, higher than c.38-60% over the last 2 months.

Bull steepening bias recently, from a more dominant bull flattening dynamic over the past 2m.

Exhibit 8: Decomposition of the 2s10s dynamic
Front end (bull steepening and bear flattening moves) driving c.20-41% of the 2s10s dynamic over the last 1-2 months as Fed on hold

	bull-Steep	bear-Flat	bull-Flat	bear-Steep
2w	40%	30%	16%	14%
1m	32%	28%	25%	15%
2m	18%	18%	34%	29%
3m	13%	29%	19%	38%

Source: BofA Global Research

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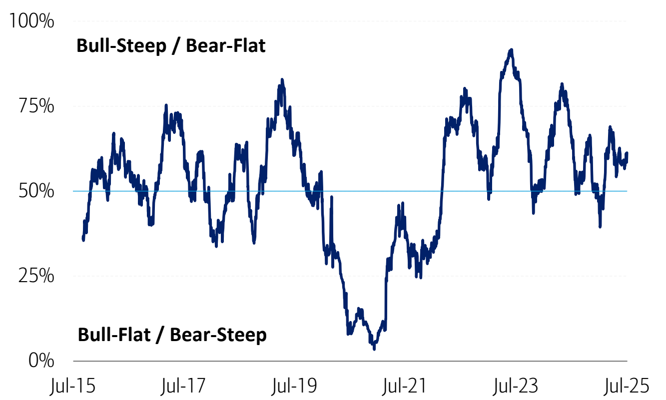
Exhibit 9: 5s30s directionality indicator (3m)
Belly continues to drive the bulk of the 5s30s curve dynamic recently



Source: BofA Global Research

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Belly drove c.82% of the 5s30s curve dynamic over the past two weeks, higher than the c.66-69% seen over the last couple of months. Bias on the 5s30s curve has been skewed towards bull steepening over the past 2 weeks, vs a relatively even split between bull steepening & bear flattening over the past 1-2 months

Exhibit 10: Decomposition of the 5s30s dynamic
Belly continues to lead the dynamic

	bull-Steep	bear-Flat	bull-Flat	bear-Steep
2w	53%	29%	14%	4%
1m	35%	34%	19%	12%
2m	33%	33%	16%	18%
3m	30%	31%	14%	25%

Source: BofA Global Research

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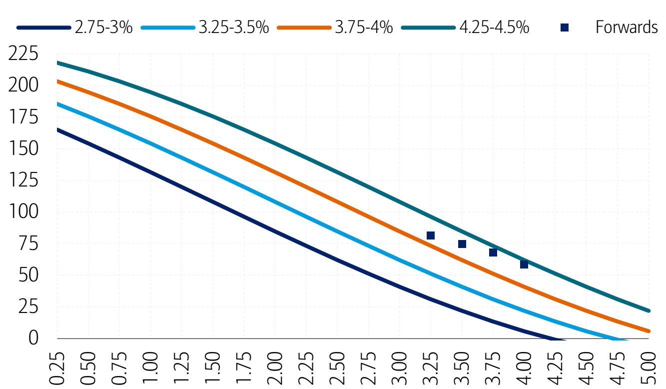
Flattening dynamic in the cycle vs. neutral rate view

Exhibit 11: 2s10s bull steepening dynamic vs. neutral rate view
Forward curve levels (y-axis) vs. fed funds (x-axis) still overpricing 2s10s bull steepening potential, particularly near-term



Source: BofA Global Research

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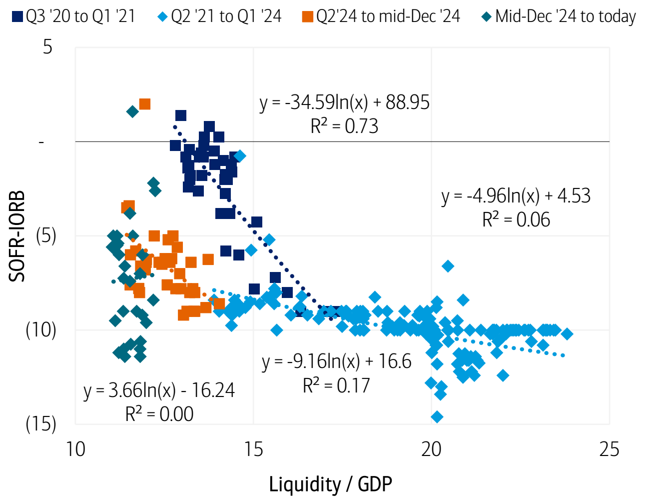
The 2s10s trajectory priced in curve forwards vs. 3-month OIS forwards seems to be still overpricing the bull steepening potential near term, with a trajectory consistent with a neutral rate assumption c.4% or slightly above. This is inconsistent with the tendency to reprice neutral rate expectations lower in slowdown or risk-off scenarios.

Front end

SOFR/FF basis

Exhibit 12: SOFR-IORB spread versus Liquidity / GDP
As liquidity has declined, SOFR has begun to print higher in the range



Source: BofA Global Research, Bloomberg, FRB. Note, red dot implies latest week of data
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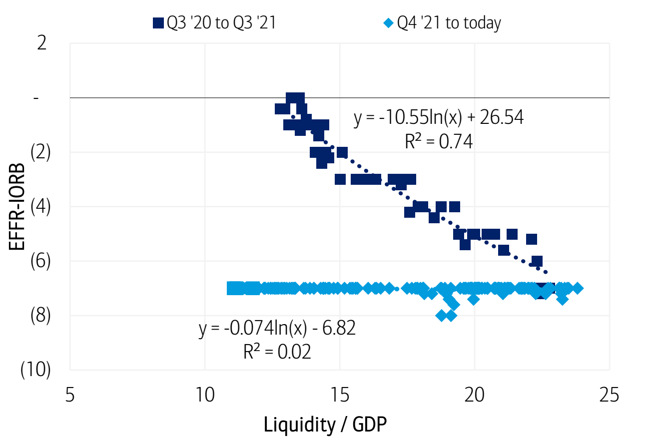
We update our model for our SOFR-IORB forecast by running 4 log linear regressions, representing 4 different periods (Exhibit 12), and in each regression, we input 3 variables: (1) ON RRP + Fed Reserves (Fed liquidity) over GDP, (2) marketable debt excluding Fed holdings over GDP, and (3) primary dealer UST holdings.

The relationship between SOFR-IORB and liquidity to GDP has broken down in the most recent period, likely due to debt limit dynamics, as represented by the green diamonds in Exhibit 12. As a result, we exclude the latest period of data, from mid- Dec '24 to today, in our forecast output for the FF-SOFR spread (Exhibit 14).

Post debt limit, we expect to see SOFR move up quickly within the range due to the liquidity drain.

Exhibit 13: EFFR-IORB spread vs Liquidity / GDP
EFFR has been sticky despite liquidity drain



Source: BofA Global Research, Bloomberg, FRB. Note, red dot indicates latest week of data
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We update our EFFR-IORB forecast, which includes two regression periods. The first period, 3Q20 to 3Q21 represents when FF was sensitive to changes in liquidity. The second period, 4Q21 to today, represents when FF has been relatively sticky and insensitive to changes in liquidity.

To forecast EFFR-IORB, we use a log linear regression of 2 variables (1) ON RRP + Fed Reserves (Fed liquidity) over GDP (Exhibit 13) and (2) marketable debt to GDP and then average the regression output over the two periods.

We find that EFFR has been sticky at 7bps below IORB driven by foreign bank arbitrage demand and limited FHLB bargaining power. We expect EFFR to eventually rise post debt limit resolution as liquidity continues to drain.

Exhibit 14: Regression outputs for FF-SOFR spread (bps)
We forecast SOFR/FF basis tightening in 2H25 post debt limit resolution

	SOFR-IORB	EFFR-IORB	FF-SOFR
Sep-25	0.5	-1.9	-2.4
Dec-25	1.8	-1.6	-3.4
Mar-26	3.1	-1.4	-4.5
Jun-26	3.4	-1.3	-4.7
Sep-26	3.7	-1.3	-4.9
Dec-26	4.4	-1.2	-5.6

Source: BofA Global Research
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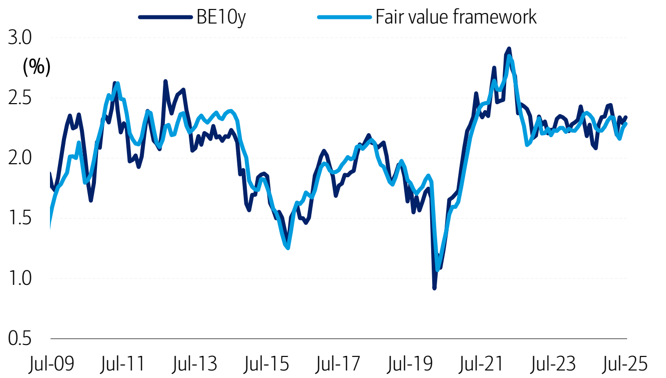
To calculate our regression output, for SOFR-IORB, we exclude the 'mid-Dec '25 to present' period and weight the remaining periods: (1) 3Q20-1Q21 (45%), (2) 2Q21-1Q24 (10%), (3) 2Q24 to mid Dec '24 (45%). For our EFFR-IORB calc, the 2 periods are weighted equally.

Now that the debt limit has been resolved, SOFR-IORB will likely move up faster than FF and drive the SOFR-FF basis tighter. We see risk of funding spikes post debt limit, during and after the TGA rebuild, due to reserve drain and limited excess cash left in the ON RRP.

TIPS

Macro framework for breakevens (BEs)

Exhibit 15: Macro framework for 10y BE
10y BE fair value c.230bp, market in line vs. fundamentals



Source: BofA Global Research; Bloomberg

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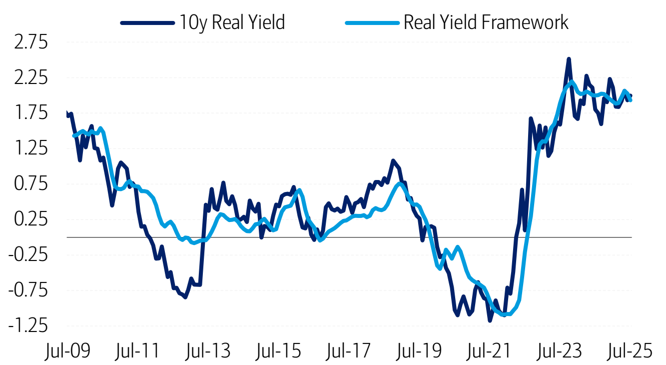
We model 10y BE as a function of inflation expectations, inflation risk premium, and inflation liquidity premium components.

US 10y breakevens fair value is c.230bp, wider by c.5bp since early Jun '25. The market is trading breakevens marginally wide (c.5bp) vs fundamental FV levels.

Real yield (10y BE vs. 10y nominal model)

Exhibit 16: 10y real yield framework
Fair value for 10y real yields in macro framework c.1.95-2%



Source: BofA Global Research

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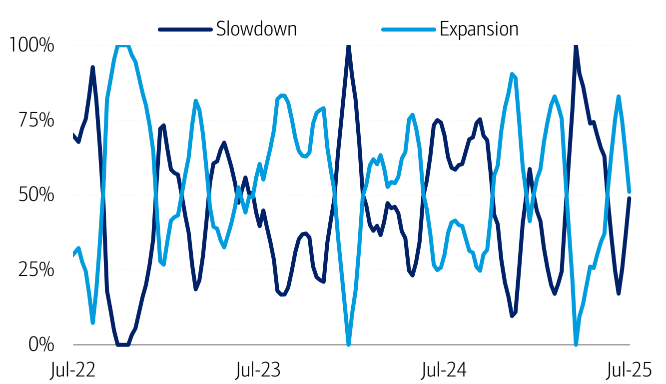
US 10y real rate FV is c.1.95-2%, marginally lower (c.5bp) since early Jun '25.

The market is currently trading 10y real yields marginally cheap relative (max c.5bp) to the fair value level suggested by our macro framework.

Directionality of 10y BEs

Exhibit 17: Likelihood of slowdown vs. expansion scenarios (1-month average frequencies) extracted from the dynamic of 10y BEs
Expansion likelihoods now c.50-55% currently



Source: BofA Global Research

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10y BEs frequency of orthodox moves (c.68% over last month) slightly below historical averages (c.75-80%).

Likelihood of expansion now only marginally > slowdown scenarios. **Normalized frequencies over the last month stand at c.50-55% expansion vs. c.45-50% slowdown**.

Exhibit 18: 10y breakeven directionality
Orthodox moves driving c.62-68% of 10y BE dynamic vs. 75-80% historically

	bear-Wide	bull-Tight	bull-Wide	bear-Tight
Current	22%	40%	25%	12%
1m	43%	25%	18%	14%
2m	47%	27%	17%	9%
3m	39%	36%	15%	10%

Source: BofA Global Research

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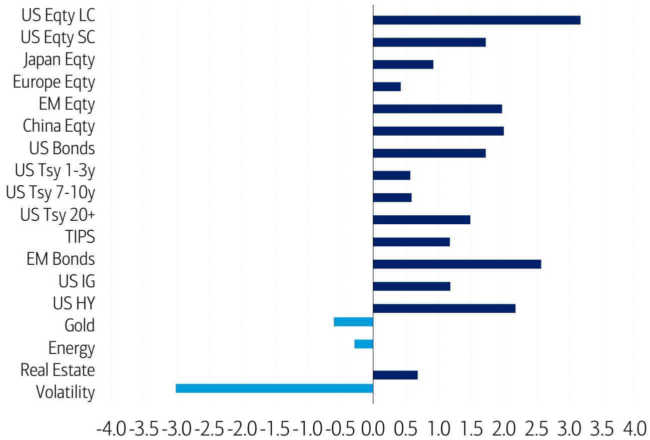
Asset allocation

Flows and allocation bias

Exhibit 19: Gauge of risk profile obtained from ETF flows
Marginal upgrade in risk sentiment over the past month



Source: BofA Global Research

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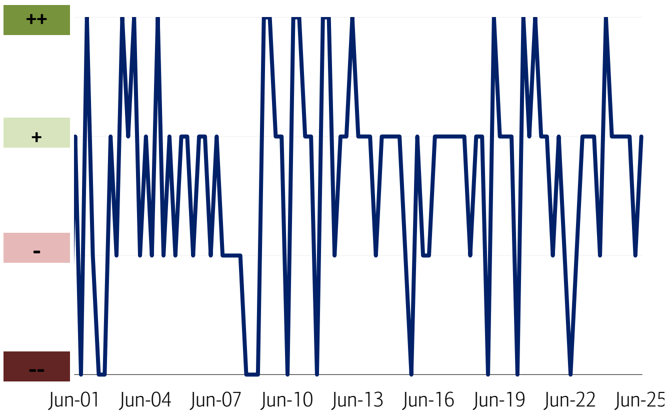
Gauge of risk profile and allocations obtained from ETF flows suggests a slight increase in risk appetite over the past month:

- Bonds – Adding USTs particularly the backend (<+1.5σ) and TIPS. Adding to EM bonds (c.+2.5 σ).
- Equities – Materially long LC and SC US, long Japan & European equities. Marginally long EM equities.
- Credit – Long IG & HY (>+1σ).
- Alternatives – Marginal selling of Gold & Energy & small long in Real Estate.
- Volatility – Short equity volatility in a potential return to carry

Exhibit 20: 4-factor framework for relative asset class returns
Upgrade of risk bias to moderate risk-on over the past quarters



Source: BofA Global Research

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Historical transition likelihoods suggest that from moderate risk-on or moderate risk-off regimes, we see (1) 10-20% likelihood of transition to risk-off (hard landing in the current context), (2) 20-30% moderate risk-off scenarios (soft landing in the current context), (3) 45-50% moderate risk-on scenarios (no landing in the current context); and (4) 10-15% likelihood of shifting to risk-on (which contains reacceleration scenarios).

Exhibit 21: Transition likelihood over the next 1-2 quarters
Transition likelihood over the next 1-2 quarters

	--	-	+	++
--	21%	7%	21%	50%
-	18%	21%	46%	14%
+	12%	32%	48%	8%
++	0%	25%	55%	20%

Source: BofA Global Research

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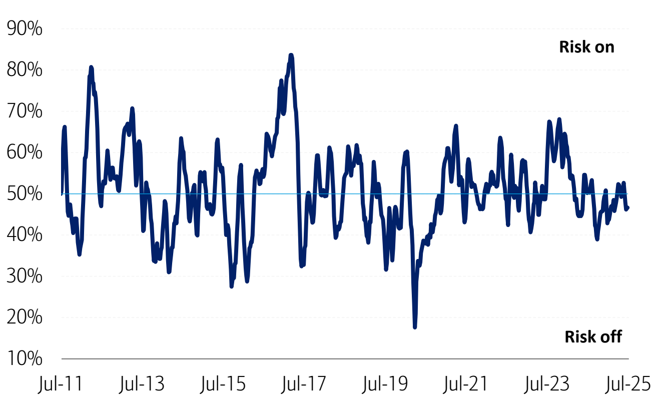
Exhibit 22: Positioning bias extracted from futures across assets
Risk bias neutral / marginally risk off (c.47%) vs c.46% in early Jun.



Source: BofA Global Research, Bloomberg, CFTC COT

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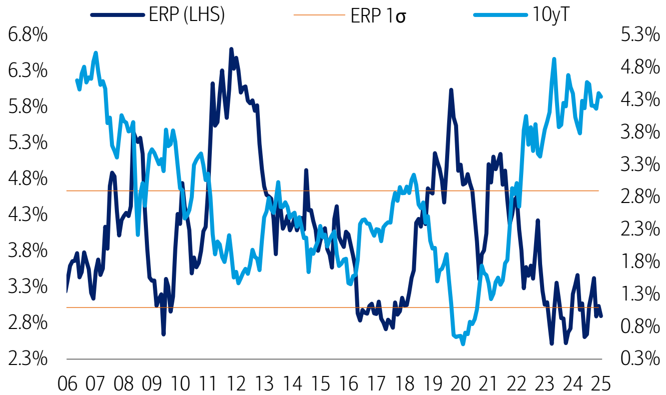
As of the last CFTC COT release, the positioning bias extracted from futures across asset classes showed neutral / marginally risk off sentiment (c.47%), a marginal increase from a c.46% level in early Jun.

Exhibit 23: Equity Risk Premium (ERP) framework

ERP wider by c.10bp over the past month



Source: BofA Global Research

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ERP widened by c.10bp over the past month but is still at relatively tight levels historically.

Tight ERP levels create scope for negative feedback loops between bond yield selloffs and risky assets and the potential for that feedback to close into a bid for USTs in scenarios where further bond selloffs are not accompanied by an upgrade to earnings.

Exhibit 24: Global 10y bond RV

Metrics of RV across 10y DM bond yields generated in our global yield framework

	Actual	Model	Last	Intrinsic Residual Average	StdDev	Z-Score
US	4.35	4.41	-5.9	0.3	31.5	-0.2
UK	4.55	4.13	42.4	1.2	31.1	1.3
Canada	3.35	3.45	-10.0	0.8	21.3	-0.5
Japan	1.43	0.71	72.0	0.8	22.6	3.1
Australia	4.19	4.04	15.2	2.3	26.7	0.5
Switzerland	0.39	0.63	-23.5	1.4	19.5	-1.3
Germany	2.61	2.44	16.9	-0.6	15.4	1.1
France	3.28	3.14	13.4	-0.8	11.9	1.2
Austria	2.95	3.06	-11.5	-1.1	10.9	-1.0
Holland	2.78	2.75	3.0	-0.8	12.1	0.3
Belgium	3.16	3.17	-1.1	-0.5	22.6	0.0
Italy	3.44	4.04	-60.0	-4.4	45.8	-1.2
Greece	3.28	3.36	-7.4	-36.5	150.5	0.2
Ireland	2.87	2.40	46.1	44.3	75.1	0.0
Portugal	3.04	2.97	7.1	-13.2	48.4	0.4
Spain	3.22	3.19	2.9	-4.1	38.0	0.2

Source: BofA Global Research. Std Dev: standard deviation.

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Cheapest 10y bonds on the framework:

- Japan +3.1σ from +3.2σ early Jun (less cheap)
- France +1.2σ from +1.0σ early Jun (cheaper)
- UK +1.3σ from +1.2σ early Jun (cheaper)
- **Germany +1.1σ from +0.7σ early Jun (cheaper)**

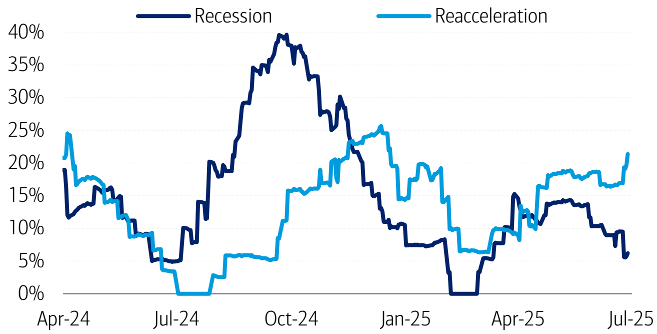
Richest 10y bonds on the framework:

- Switzerland -1.3σ from -2.0σ early Jun (less rich)
- Canada -0.5σ from -0.6σ early Jun (less rich)
- Italy -1.2σ from -1.2σ early Jun (unchanged)
- Austria -1.0σ from -1.0σ early Jun (unchanged)
- **US -0.2σ from -0.2σ early Jun (unchanged)**

Directionality framework

2s10s directionality & recession vs. expansion likelihoods

Exhibit 25: 2s10s dynamic & recession vs. reacceleration likelihoods
c.15-20% likelihood of reacceleration vs. c.5-10% likelihood of recession



Source: BofA Global Research

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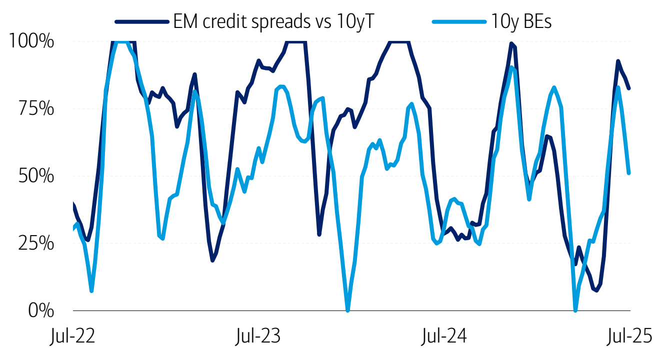
Likelihoods of recession and reacceleration scenarios proxied by the frequency of material bull steepening and bear flattening moves in the dynamic of the 2s10s curve.

We currently see c.5-10% likelihood of recession scenarios reflected in the recent 2s10s curve dynamic vs. c.15-20% reacceleration likelihoods.

Higher stagflation likelihoods may continue to cap the Fed reaction function to negative growth shocks and limit the frequency of bull steepening moves that may be delivered on the curve, therefore leading to an underpricing of recession likelihoods in this framework currently.

EM corporate credit spreads vs. 10yT dynamic

Exhibit 26: Likelihood of expansion reflected in the relative dynamic of EM corporate credit spreads vs 10yT yields & the 10y BEs dynamic
c.80-85% likelihood of expansion reflected in the dynamic of EM corporate credit vs. c.50-55% reflected in the dynamic of 10y BEs



Source: BofA Global Research

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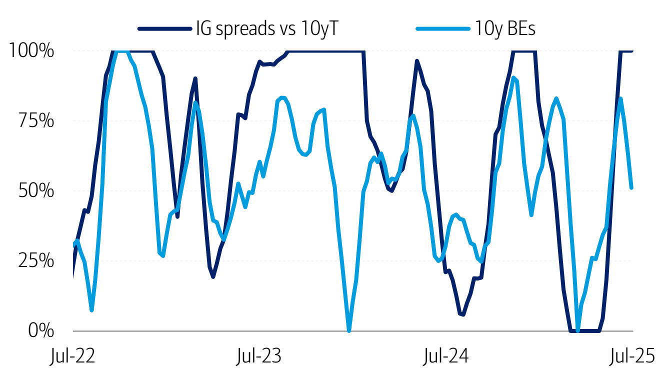
Likelihoods of expansion scenarios proxied by the frequency of bear tightening moves (higher yields, tighter credit spreads) in the relative dynamic of EM Corp credit spreads vs 10yT yields.

We see lower likelihoods of expansion scenarios reflected in the recent dynamic of 10y BEs (c.50-55%) vs in the recent relative dynamic of EM corporate credit spreads vs. 10yT yields (c.85-90% currently), supporting a carry bias into EM.

IG Cash vs. 10yT dynamic

Exhibit 27: Likelihood of expansion reflected in the relative dynamic of IG Cash vs. 10yT yields & the 10y BEs dynamic
c.100% likelihood of expansion reflected in the dynamic of IG Cash vs. c.50-55% likelihood of expansion reflected in the dynamic of 10y BEs



Source: BofA Global Research

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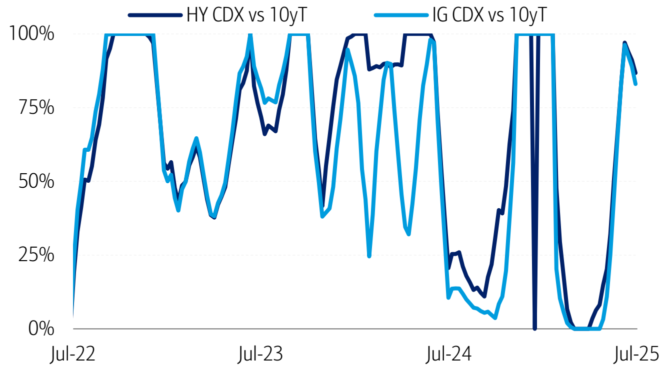
Likelihoods of expansion scenarios proxied by the frequency of bear tightening moves (higher yields, tighter credit spreads) in the relative dynamic of IG Cash vs. 10yT yields.

We see lower likelihoods of expansion scenarios reflected in the recent dynamic of 10y BEs (c.50-55%) vs the recent relative dynamic of IG Cash vs. 10yT yields (c.100%).

IG/HY CDX vs. 10yT dynamic

Exhibit 28: Likelihood of expansion reflected in the relative dynamic of IG/HY CDX vs. 10yT yields

c.80-85% likelihood of expansion priced in the relative dynamic of IG CDX vs 10yT yields, c.85-90% expressed in the dynamic of HY CDX vs 10yT



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Likelihoods of expansion scenarios are proxied by the frequency of bear tightening moves (higher yields, tighter credit spreads) in the relative dynamic of IG/HY CDX vs. 10yT yields.

We see only c.80-85% likelihood of expansion scenarios reflected in the relative dynamic of IG CDX vs 10yT yields, and c.85-90% likelihood reflected in the relative dynamic of HY CDX vs 10yT yields. We assign a lower-than-average confidence level to these results, given a recent high frequency of non-orthodox moves (i.e., bear widening and bull tightening moves).

Summary statistics

Exhibit 29: Summary of statistics for directionality framework applied to 10y BEs dynamic and relative dynamic of EM Corp credit, IG Cash & IG/HY CDX vs. 10yT yields

Only c.50-55% expansion likelihoods priced in the dynamic of 10y BEs, but materially higher expansion likelihoods expressed in the dynamic of EM credit vs 10yT yields, and in relative dynamic of IG Cash and IG/HY CDX vs. 10yT yields

	Likelihoods		% orthodox moves			Confidence
	Expansion	Slowdown	Historical	StdDev	Current	Index
BE	51%	49%	74%	19%	60%	40%
EM Credit	83%	17%	72%	20%	89%	79%
IG Cash	100%	0%	66%	22%	73%	60%
IG CDX	83%	17%	55%	26%	36%	33%
HY CDX	87%	13%	55%	27%	37%	34%

Source: BofA Global Research

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Only c.50-55% expansion likelihoods priced in the dynamic of 10y BEs, but materially higher expansion likelihoods expressed in the dynamic of EM credit vs 10yT yields, and in relative dynamic of IG Cash and IG/HY CDX vs. 10yT yields.

Appendix: Model descriptions

Macro model

In our macro framework for the dynamic of Treasuries, we calculate the first two PCs of the rates curve (2s, 5s, 10s and 30s) and regress each of these on Fed funds (to define cycle dynamic) and the principal components of growth variables, inflation variables, and employment variables (see our report, A hitchhikers guide to RV on the UST curve).

Macro models are calibrated over long historical windows, generally longer than the average cycle length (somewhere between 7 years and 15 years) to capture the broader dynamic of Treasuries throughout the cycle. Significantly, these models tend to break down in periods of significant non-economic buying of Treasuries. We have seen several of these periods over the last couple of cycles, for example the following:

- The Greenspan conundrum, when we saw the back end of the Treasury curve rallying even as the Fed hiked rates in the early stages of the 2004-06 tightening cycle, driven foreign central bank buying.
- Quantitative easing (QE) periods, when the Fed acts as a non-economic buyer. Indeed, in general, these periods drive a negative correlation between growth and yields, and it is a challenge to avoid solutions that converge to these sorts of non-economic betas in macro frameworks for the dynamic of yields.
- Global yield demand in a context of very low global yields. Indeed, global demand for USTs may be driven less by US fundamentals but more by yield differentials to other DM yields and the cost of hedging the FX exposure.

To account for the pressures on the Treasury curve from these non-economic distortions, we include in our independent data set the dynamic of the Fed balance sheet and the first principal component of global DM rates. In our framework, therefore, we converge to two solutions: one whereby we express fair value consistent with US macro fundamentals alone and an adjusted framework whereby we incorporate the impact of overseas demand on the Treasury curve.

See the report, Introducing a new UST macro framework, for a description of our DFM macro framework.

Global yield framework

This framework is an alternative approach to PCA, which addresses the shortcoming of PCA not being able to capture trends in the data to a large extent. The framework can achieve this by capturing the shared covariances in the dataset through hidden state processes and also allows for the modeling of the time-varying dynamic of these factors explicitly. In a relatively simple specification, a number of factors (determined a-priori) are defined through a given state equation:

$$x(t) = B * x(t - 1) + w(t)$$

while the independent variables are modeled as a function of these factors:

$$y(t) = Z * x(t) + v(t)$$

where:

$$w(t) \sim MVN(0, Q)\ ,\ \ v(t) \sim MVN(0, R)\ ,\ x(0) \sim MVN(X0, V0)$$

The factors (*x's*) are calibrated to explain the dynamic of the independent variables (*y's*) through the linear combinations defined by the calibrated projection matrix (*Z*). The projection matrix Z can be constrained to add more intuition to the interpretability of the factors.

Decomposition of the 10yT dynamic

In statistics, the traditional frequentist approach assumes that each parameter has a "true" value, and the goal is to find a close estimate to that (fixed) value. In contrast, the Bayesian approach views each parameter as a random variable, characterized by some underlying probabilistic distribution, along with constraints on the relative dynamic of the different parameters. The latter allows the analyst to avoid non-economic solutions, for example models where Treasury yields are negatively correlated with growth.

The vector auto-regressive framework is used to capture the relationship between multiple time series as they evolve over time, versus lagged levels. A *p*th-order VAR refers to a VAR model with a time lag for the last *p* time periods and is denoted VAR(*p*). This can be expressed as follows:

$$y(t) = a0 + A1 * y(t-1) + \dots + Ap * y(t-p) + \varepsilon(t) \quad \text{with} \quad \varepsilon(t) \sim N(0,\Sigma)$$

Where $y(t)$ is the $M \times 1$ vector of endogenous variables, $a0$ is the $M \times 1$ vector of constants, Ai is the $M \times M$ time-variant coefficient matrix, and $\varepsilon(t)$ is the $M \times 1$ exogenous factor or the error terms with a Gaussian distribution with mean zero and variance-covariance matrix Σ.

In our formulation, we adapt an existing European Central Bank (ECB) framework[1] to decompose the dynamic of 10yT yields in terms of monetary policy, demand, risk, and inflation shocks. The key in this model is to define the sign restriction priors that transform the dynamic of the underlying variables in the model (10yT yields, 5y5y inflation, real effective exchange rate for the dollar, and cyclical adjusted P/E ratios) into the shocks below (see our report, A hitchhikers guide to RV on the UST curve).

Curve directionality

One framework that adds to the understanding of the dynamic of the curve is a measure of how frequent the different modes for the curve (bull flattening, bear steepening, bear flattening, and bull steepening) have been in recent history. One can do this by constructing 4 indices, one for each mode, that measure the number of bp moves that can be attributed to that mode in a given historical window versus the sum of absolute moves on the curve over the same period. Those 4 indices can be grouped into short leg (2yT leg in the 2s10s dynamic) driven moves (adding the bear-flattening and bull steepening indices) and belly (10yT in the 2s10s dynamic) driven moves (adding bull flattening and bear steepening moves). This framework is useful to gauge the prevailing modes on the curve and understand the periods when the curve is undergoing a shift in its dynamic.

See the report, The utility of directionality indicators, from 5 February 2025, for a broader discussion of our directionality framework.

PCA on global 10y BEs

We run a 2-factor PCA on 10y breakevens across US, UK, AU, JP, EU and CAD with at least 6 years of history. While central bank policy is a factor for the global inflation market, especially around pivots or other surprises, we find that the first principal component (PC1) explains 85% of the variance in global breaks and is highly correlated with the price of oil. The second principal component of breakevens accounts for 9% of the variance, which results in a total of 94% covered by 2 factors. We find that PC2 correlates well to global financial stress and the Fed's published real rate term premium (see our report, Rates relative value update with PCA, 14 December 2022).

[1] *European Central Bank, Financial Stability Review, Nov. 2018,* www.ecb.europa.eu/pub/pdf/fsr/ecb.fsr201811.en.pdf

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